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Development of a cavum septi pellucidi after Ommaya reservoir placement: a cause of shunt malfunction

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ABSTRACT

Objective and Importance: We present a complication of Ommaya reservoir placement that has not been previously reported. The development and resolution of a cavum septi pellucidi after placement of an Ommaya reservoir for intrathecal chemotherapy is described.

Clinical Presentation and Intervention: 32-year-old male patient with stage IV Burkitt's lymphoma presented to our institution with a persistent frontal headache and was diagnosed with recurrent central nervous system disease. A right frontal Ommaya reservoir was placed using imaging assisted stereotaxy without complication and a post-operative CT scan of the brain documented that the catheter was in the ventricular system with it's tip resting against the septum pellucidum and that there was no cavum septi pellucidi. The patient experienced a generalized tonic-clonic seizure after the first administration of intrathecal chemotherapy via the Ommaya reservoir. Repeat imaging demonstrated a cavum septi pellucidi with the tip of the catheter clearly within the cyst. After catheter replacement there were no further seizures and the cavum septi pellucidi resolved.

Conclusion: This case illustrates that the septum pellucidum is made of two layers and that a potential space exists between these layers. Caution is recommended when injecting a single-hole ventricular catheter if the tip is against the septum pellucidum.

KEY WORDS: Cerebrospinal fluid reservoir; Ommaya reservoir; Ommaya reservoir, complications; cavum septi pellucidi; septum pellucidum; central nervous system lymphoma

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The cavum septi pellucidi is present in nearly all premature infants but is only seen up to 15% - 18% of normal adult brains (5, 10, 13). It is generally an asymptomatic fluid collection between the leaves of the septum pellucidum. Rarely, it can cause neurological symptoms by obstructing cerebrospinal fluid outflow (CSF) from the lateral ventricles. Shunt malfunction secondary to placement within a cavum septi pellucidi has been reported (5). In an adult, the development of a previously non-existent cavum is extremely rare. The purpose of this paper is to present a case of development of a cavum septi pellucidi after stereotactic cerebrospinal fluid reservoir placement, which led to the malfunction of the shunt requiring subsequent surgical revision.

CASE REPORT

A 32 year old male with stage IV Burkitt's lymphoma without central nervous system (CNS) involvement, having received seven cycles of chemotherapy presented to our institution with a persistent frontal headache. He was diagnosed with recurrent Burkitt's lymphoma with CNS involvement. A right frontal Ommaya reservoir was placed using imaging assisted stereotaxy without complication and a post-operative CT scan of the brain documented that the catheter was in the ventricular system with it's tip resting against the septum pellucidum and that there was no cavum septi pellucidi (Figure 1). After the first injection of intrathecal cytarabine (Ara-C) via the Ommaya reservoir the patient experienced a generalized tonic-clonic seizure, which was controlled with Ativan and Dilantin, and thereafter he remained seizure free. Repeat MRI of the brain showed no new parenchymal abnormality but demonstrated a cavum septi pellucidi, which was not seen on the prior imaging studies and the tip of the catheter was clearly in the cyst (Figure 2). Subsequently, the Ommaya reservoir could not be aspirated and the patient underwent catheter replacement. Subsequent intrathecal chemotherapy administration via the Ommaya reservoir was uneventful. Follow-up MRI for monitoring of disease progression showed near complete resolution of the cavum septi pellucidi (Fig 3). The injection of the chemotherapeutic agent into the potential space between the layers of the septum pellucidum that does not communicate with the ventricular system was deemed the cause of the patient's seizures.

DISCUSSION

The Ommaya reservoir was introduced in 1963 for the treatment of fungal meningitis and is now most commonly used for the administration of intraventricular chemotherapy for primary and secondary CNS neoplasms (8, 9). Frequently described complications include technical complications (misplacement of the device and malfunction) and infection (1, 3, 4, 7, 9, 12). Perioperative mortality is less than 1% and is usually secondary to a hemorrhagic complication or less likely from misplacement of the catheter (1, 3, 7). The incidence of technical complications ranges from 6.5% to 21% (1, 3, 7, 12). The use of imaging assisted stereotaxy and confirmation of the intraventricular placement of the catheter before administration of chemotherapy reduce the complications. While

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ARTICLE SUMMARY

The development and resolution of a cavum septi pellucidi after placement of an Ommaya reservoir for intrathecal chemotherapy is described, which has not been previously reported. The patient experienced generalized tonic-clonic seizures upon initial administration of chemotherapy via the Ommaya reservoir and follow-up imaging documented a not previously present cavum septi pellucidi. The case illustrates that the septum pellucidum is made of two layers and that a potential space exists between these layers. Caution is recommended when injecting a single-hole ventricular catheter if the tip is against the septum pellucidum.

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perioperative infection rates are low, there is an approximately 15% risk of infection during the first year following insertion of the reservoir, particularly in those accessed more than 20 times (3). A less common, but well-recognized complication is focal leukoencephalopathy, generally attributed to the neurotoxicity of the chemotherapeutic agents (2, 14). Other uncommon complications include transient hemiparesis, seizures, or growth of tumor around the catheter (1, 3, 7). Malfunction due to placement of the catheter between the layers of septum pellucidum has not been described.

Our patient underwent uncomplicated placement of an Ommaya reservoir using imaging guided stereotaxy and post-operative CT showed the intraventricular position of the catheter tip, which was against the septum pellucidum. These measures failed to avoid the development of a grand mal seizure after the first administration of intrathecal chemotherapy. Repeat imaging demonstrated a cavum septi pellucidi which was previously not present. Cavum septi pellucidi is frequently seen as an anatomic variation in imaging studies but development of a previously non-existent cavum is very rare. Sencer et al (11) described a case of dural venous sinus occlusion with associated hydrocephalus and enlargement of the preexisting cavum septi pellucidi et vergae, which regressed together with resolution of the sinus occlusion. Recently, a case of development of a cavum septi pellucidi et vergae after head trauma was reported (6). A one-way-valve communication from the third ventricle into posterior part of the cava was suggested by magnetic resonance CSF flow studies.

It is generally believed that the leaves of the septum pellucidum fuse as the neural tube infolds to form the roof of the diencephalon, and that incomplete fusion results in the cavum septum pellucidum. A second theory suggests formation of the cavum due to a secondary cleavage plane as selective fibers of the corpus callosum in the midline necrose (10, 13). The first theory best explains the formation of a septi pellucidi cyst in our patient. The tip of the ventricular catheter must have rested in the potential space between the leaves of the fused septum pellucidum and upon administration of intrathecal chemotherapy there was a re-expansion of this potential space into a cavum septi pellucidi.

The cavum septi pellucidi is most often a non-communicating cavity containing CSF that filters through the septal laminae and is reabsorbed by capillaries and veins of the septa (10, 15). The resolution of the cyst in our patient is apparently either secondary to diffusion into the ventricular system, filtration into the veins or both.

CONCLUSION

A not-previous-reported complication of Ommaya reservoir could not be prevented by measures such as stereotactic catheter placement and postoperative confirmation of the intraventricular position of the catheter. This case illustrates that there exists a potential space between the leaves of the septum pellucidum. Caution is recommended when injecting a single-hole ventricular catheter if the tip is against the septum pellucidum.

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FIGURE LEGEND

1. Unenhanced axial CT scan images (120 kV, 400mA, 4.5 mm collimation) at the level of the foramen of Monro demonstrating the Ommaya catheter tip resting against/upon the septum pellucidum. There is pneumocephalus consistent with recent placement. There is confluent subcortical and periventricular white matter hypoattenuation of the bilateral frontal lobes consistent with involvement of Burkitt's lymphoma.
- 2 a, b. Axial and coronal T2 FSE unenhanced MR images (TR 5700, TE 101) demonstrating the Ommaya reservoir tip with a cyst within an expanded cavum septi pellucidi (arrows). There are areas of confluent increased T2 signal in the bifrontal and right parietal white matter corresponding to the CT scan findings.
3. Axial T2 FSE unenhanced MR image (TR 4900, TE 102) demonstrating a revised Ommaya shunt catheter with the tip in the frontal horn of the right lateral ventricle (arrow) and near complete resolution of the cavum septi pellucidi cyst.

Figure 1

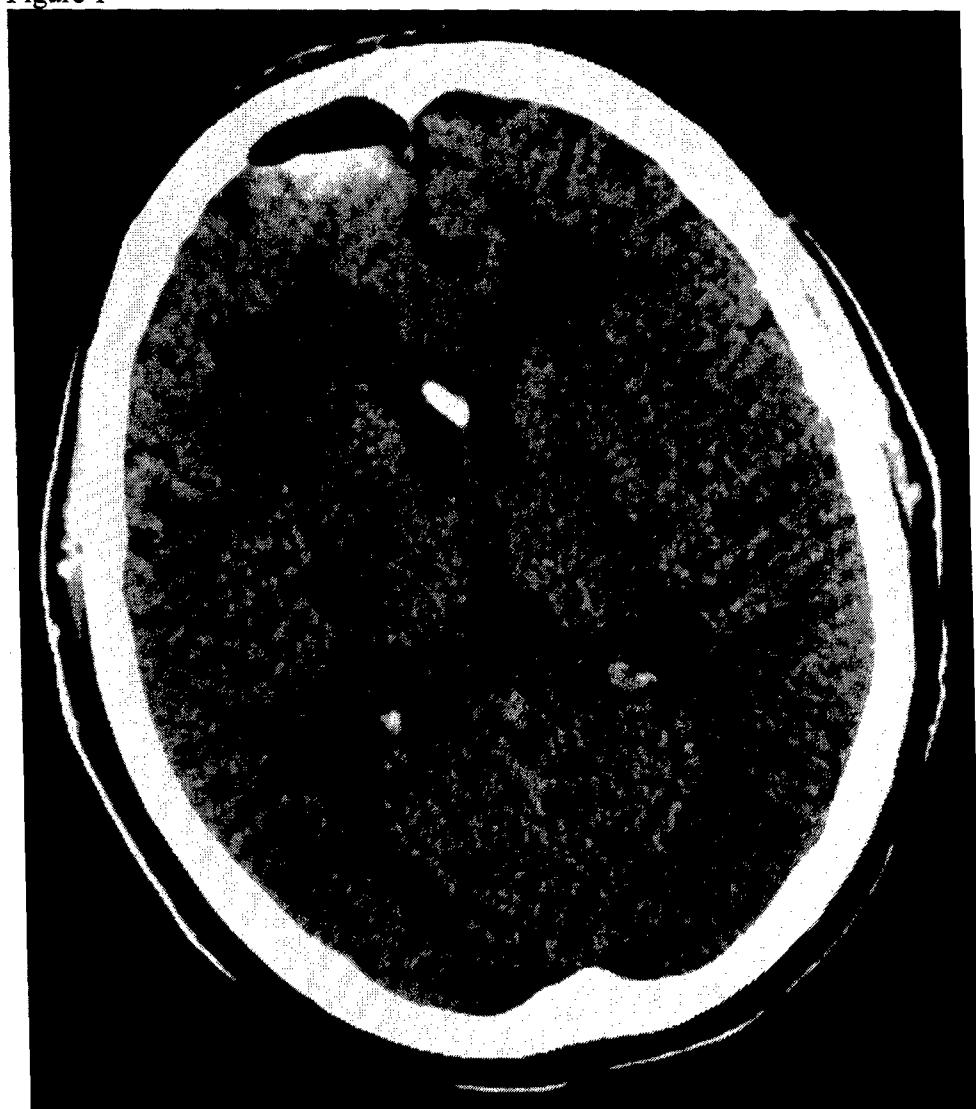


Figure 2a

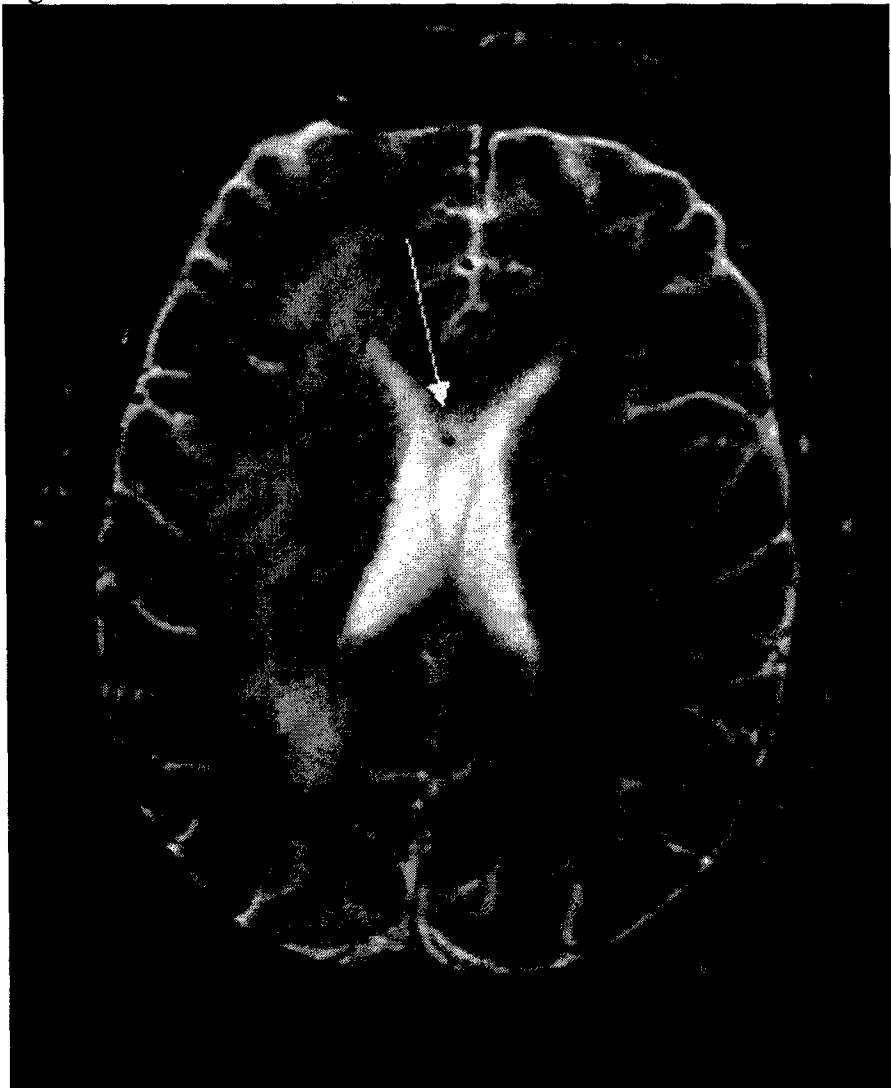


Figure 2b



Figure 3

